COURSE STRUCTURE

THIRD SEMESTER

Serial No	Subject Name	Hours			Marks		
		TH	TUT	PR	TH	SES	PR
1	Mathematics-III	3	1	0	100	50	-
2	Electrical Circuit Analysis	3	1	0	100	50	-
3	Basic Electronics	3	1	3	100	50	-
4	Fundamentals of Computing	4	1	4	100	50	50
5	Data and File Structures	4	1	0	100	50	-
6	Discrete Mathematics	4	1	0	100	50	-

FOURTH SEMESTER

Serial No	Subject Name	Hours			Marks		
		TH	TUT	PR	TH	SES	PR
1	Mathematics-IV	3	1	0	100	50	-
2	Digital System and Logic Design	3	1	3	100	50	50
3	Computer Network	4	1	0	100	50	-
4	Computer Organization	4	1	0	100	50	-
5	Operating System	4	1	0	100	50	-
6	Advanced Programming Skills	3	1	0	100	50	-
7	Data and File Structure Lab	0	0	4	-	-	50

FIFTH SEMESTER

Serial No	Subject Name	Hours			Marks		
		TH	TUT	PR	TH	SES	PR
1	Mathematics-V	3	1	0	100	50	-
2	Database Management System	4	1	0	100	50	-
3	Theory of Computation	3	1	0	100	50	-
4	Software Engineering	4	1	0	100	50	-
5	Principles of Programming Languages	3	1	0	100	50	-
6	Web Technology	4	1	0	100	50	-
7	Programming Language & DBMS Lab	0	0	4	0	0	50

COURSE STRUCTURE

SIXTH SEMESTER

Serial No	Subject Name	Hours			Marks		
		TH	TUT	PR	TH	SES	PR
1	Principles of Economics & Accountancy	3	1	0	100	50	-
2	Communication Engineering	3	1	0	100	50	-
3	Microprocessor & Applications	3	1	3	100	50	50
4	Design and Analysis of Algorithms	4	1	0	100	50	-
5	Compiler Construction	4	1	0	100	50	-
6	Mini Project On Application Development	0	0	6	-	100	-
7	Operating System and Networking Lab	0	0	3	-	-	50

SEVENTH SEMESTER

Serial No	Subject Name	Hours			Marks		
		TH	TUT	PR	TH	SES	PR
1	Industrial Organization and Management	3	1	0	100	50	-
2	Microcontroller Applications	3	1	0	100	50	-
3	Object Oriented Analysis & Design	4	1	0	100	50	-
4	Computer Graphics	4	1	3	100	50	-
5	Elective-I	4	1	0	100	50	-
6	Project-I	0	1	6	-	100	50

EIGHTH SEMESTER

Serial No	Subject Name	Hours			Marks		
		TH	TUT	PR	TH	SES	PR
1	Computer Architecture	4	1	0	100	50	-
2	Software Architecture	4	1	0	100	50	-
3	Distributed Systems	4	1	0	100	50	-
4	Elective-II	4	1	0	100	50	-
5	General Viva	0	3	0	-	100	-
6	Project-II	0	1	10	-	150	50

LIST OF SUBJECTS FOR ELECTIVE-I

1. Artificial Intelligence
2. Parallel Algorithms
3. VLSI System Design
4. Digital Image Processing
5. Simulation and Modeling
6. Combinatorics and Graph Theory
7. Embedded System

LIST OF SUBJECTS FOR ELECTIVE-II

1. Knowledge based computer systems
2. Electronic Design Automation
3. Pattern Recognition and Machine Learning
4. Real Time Systems
5. Computer Vision
6. Intelligent System
7. Human Computer Interaction

COURSE SYLLABUS FOR 3RD SEMESTER SUBJECTS

SUBJECT: FUNDAMENTALS OF COMPUTING

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

Practical: 50 Marks

Components of a digital computer, block diagram, software, hardware, I/O devices, languages-machine, assembly, high level, compiler, interpreter, problem solving – algorithms , pseudo code, flowchart , Learning the form of a C program, Declaring variables, designing program flow and control, defining and using functions, using standard terminal I/O functions.

Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes - automatic, register, static and external , Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity.

Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch. Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size. Purpose and usage of structures, declaring structures, assigning of structures. Components in overlapping memory, declaring and using unions .h vs. private .c files, Hiding private variables and functions.

Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, manipulation of linked linear list, pointer to structure, arrays and pointers, array of pointers, function pointers

Bit access and masking, pointing to hardware structures. Reading command line arguments, creating and accessing files, file opening modes, formatted disk I/O.

Preprocessor directives, Defining and calling macros, utilizing conditional compilation, passing values to the compiler. Input / Output : fopen , fread, etc, string handling functions, Math functions : log, sin, alike Other Standard C functions.

Books and references:

1. Herbert Schield, Complete reference in C, TMH
2. Yashwant Kanetkar, Let US C, BPB
3. Balaguruswamy, Programming in ANSI C, TMH
4. Yashwant Kanetkar Pointers in C
5. Kernighan and Ritchie, The C programming language

SUBJECT: DISCRETE MATHEMATICS

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I (MAX 10 MARKS)
Set Theory: Sets, subsets, power sets and sets operations.

UNIT – II (MAXIMUM 30 MARKS)
Relations: Representation of relation by graph, properties of relation, equivalence relation and partition, partial ordering, posets.

UNIT-III (MAXIMUM 30 MARKS)
Functions: Mapping-injection, surjection and bijection, and their properties; composition of functions; special functions; peono postulates, pigeonhole principles.

UNIT-IV (MAXIMUM 40 MARKS) Definition and elementary properties of group, monoids, rings, fields, vector spaces and subspaces, lattices, Boolean algebra.

UNIT-V (MAXIMUM 30 MARKS) Mathematical logic and prepositional calculus: Normal forms, tautology and contradiction, predicate calculus, first and second order predicate calculus, inference rule.

Test Books/Reference Books:

1. J. P. Trembley and R. P. Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hill Publication.
2. C. L. Liu, Elements of Discrete Mathematics.

SUBJECT: DATA AND FILE STRUCTURE

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I (MAXIMUM 10 MARKS)
Fundamental Notations: Primitives and composite data types, dependence of algorithms on data structure, time and space complexity of algorithms.

UNIT-II (MAXIMUM 80 MARKS)
Data Structures: linear lists, stacks, queues, arrays, link lists, sparse matrices, trees, graphs, strings, hash tables-their representation in sequential storage and link lists and algorithms for manipulation operations (e. g. addition, deletion, insertion, search, sort, merge, push, pop, enqueue, dequeue, traverse, visit etc). Algorithms for dynamic storage allocation and garbage collection.

UNIT-III (MAXIMUM 20 MARKS)

File Structures: Concepts of fields, records and file. Sequential file organization, variable length records and text files: indexing structure like B-trees, ISAM; Hashing techniques for direct files; inverted lists, multilists.

Test Books/Reference Books:

1. Horowitz and Sahani, Fundamentals of Data Structures, Galgotia Publications.
2. Trembley and Sorenson, Introduction to Data Structures with Applications, McGraw-Hill Publication.
3. Lipchutz, Theory and Problems of Data Structures.
4. A. V. Aho and J. D. Ullman, Data Structures, Addition Wesley, 1984.
5. D. E. Knuth, The Art of Computer Programming, Vol. 1. Narosa Publishers, 1985.
6. N. Wirth, Algorithms + Data Structures Programs, Prentice Hall, 1976.
7. A. S. Tannenbaum, Data Structure in C and C+ +

COURSE SYLLABUS FOR FOURTH SEMESTER SUBJECTS

SUBJECT: COMPUTER ORGANIZATION

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I (MAXIMUM 15 MARKS)

Fundamental Components of Digital Computers: CPU, memory, I/O devices. Von Neumann stored program principles.

UNIT-II (MAXIMUM 30 MARKS)

Instruction format- OP code, Zero address, single address and two address instructions. Instruction types- Data transfer, arithmetic, logical. Program sequencing and control, I/O transfers. Addressing modes- implied, absolute, register, register indirect, index relative. Compute operating cycles- instruction fetch, operand fetch and execution cycle.

UNIT-III (MAXIMUM 25 MARKS)

Processor design concepts- data path organization control steps for instruction cycles, estimation of instruction execution time.

UNIT-IV (MAXIMUM 20 MARKS)

Machine and Assembly language programming- PDP-11 and/or any other representative computer systems.

UNIT-V (MAXIMUM 30 MARKS)

I/O Organization: Example of I/O devices- VDU, keyboard, printer and disk- Construction and characteristics. Programmed controlled I/O, interrupt driven I/O, direct memo-ry access mechanism. Data transfer protocols- serial and parallel. I/O channel and I/O Processor.

UNIT-VI (MAXIMUM 40 MARKS)

Memory Organization: Basic concepts, semi conductor memories- static and dynamic memories. Bit cells. Semiconductor memory organization- linear and two dimensional- multiple module memories. Memory Hierarchy- cache memory, virtual memory.

Test Books/Reference Books:

1. Hamacher, Vranesic and Zaky, Computer Organization, McGraw- Hill Publication.
2. M. M. Mano, Computer System Architecture, Prentice- Hall of India.
3. Tannenbaum, Structured Computer Organization.

SUBJECT: OPERATING SYSTEM

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I :MARKS-10 (MAX)

Historical Perspective: batch processing, multiprogramming, time sharing, real-time and distributed systems; functions, components and structure of an operating system. Current Status and future trends.

UNIT-II:MARKS-60 (MAX)

PART I.

Process Management: Process and Threads and Data Structure used for their implementation,

PART-II:

Support for concurrent processes-shared data, critical section, mutual exclusion, busy from waiting, lock and unlock primitives, semaphore, synchronization, block and wakeup,

PART -III:

Inter process communication, message passing mechanism.

PART -IV:

Scheduling-process states, interrupt mechanisms, scheduling algorithm, implementation of concurrency primitives.

PART -V :

System deadlock-prevention, detection and avoidance.

UNIT-III:MARKS-20 (MAX)

I/O Management: I/O software goals and structure, Device driver-Examples: terminal, clock, disk, printer etc.

UNIT-IV:MARKS-40 (MAX)

Memory Management: Contiguous and non-contiguous memory allocation, swapping, virtual memory, paging and segmentation-page replacement and space allocation policies; protection and sharing.

UNIT-V:MARKS-20 (MAX)

File System: System structure, file management strategies, tradeoffs, directory structures, file system protection. Security, integrity and reliability. Device independence, file server concepts.

UNIT-VI:MARKS-10 (MAX)

PART-I

Kernel design and scheduling of reusable resources.

PART-II

Example operating system- UNIX, WINDOWS

Test Books/Reference Books:

1. A. S. Tannenbaum , Operating Systems: Design and Implementation, Prentice-Hall of India.
2. M. Milenkovic , Operating Systems: Concepts and Design, McGraw Hill.
3. M. Bech , Design of the Unix operating system, Prentice-Hall of India.
4. Stevens, Unix Network Programming, Prentice-Hall of India.

SUBJECT: ADVANCED PROGRAMMING SKILLS

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT – I (MAX 10 MARKS)

Different programming paradigms

UNIT – II (MAX 30 MARKS)

Introduction to Java , Data types, Variables, Arrays, Operators, Control statements, Classes, Constructors, Destructors, Garbage collection, Overloading methods, Overloading Constructors, Argument passing, Returning objects, Recursion

UNIT-III (MAX 25 MARKS)

Inheritance, Method overriding, Dynamic method dispatch, Abstract classes

UNIT-IV (MAX 25 MARKS)

Packages, Importing packages, Interfaces, Nested interfaces, Applying interfaces, Handling Exceptions, Java built-in exceptions

UNIT-V (MAX 40 MARKS)

Introduction to multi-threaded programming, the java thread model, Synchronization, Messaging, The thread class and runnable interface, creating a thread, creating multiple threads, Enumerations, I/O basics

UNIT-VI (MARX 30 MARKS)

Applets, The HTML applets tag, Java library, Handling events, Introduction to AWT, The concurrency utilities

UNIT-VII (MAX 20 MARKS)

Java beans, Introduction to swings, Servelets

UNIT- VIII (MAX 40 MARKS)

Introduction to C# , Basic concepts of .NET: the C# environment, Literals, Variables and data types, Operators and expressions, Control statements, Methods in C#, Arrays, Strings, Structures and Enumerations, Classes and objects, Inheritance and polymorphism, Interfaces, Operator overloading, I/O basics, Handling Exceptions, multi-threading in C#, Windows and web based application development on .NET, Recent trends in programming methodologies.

Essential Reading:

1. H. Schildt, The Complete Reference Java, Tata McGraw Hill, 7th Ed, 2006.
2. E. Balagurusamy, Programming in C#: A Primer, McGraw Hill, 2nd Ed, 2008.

Supplementary Reading:

1. E. Balagurusamy, Programming in JAVA, McGraw Hill, 3rd Ed, 2007.
2. J. M. Slack, Programming and Problem Solving with JAVA, Thomson/Brooks Core Publishing Company, 1st Indian Reprint, 2007.

SUBJECT: COMPUTER NETWORK

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT—I (MAX 25 MARKS)

Data transmission fundamentals, time/frequency representation of digital signals, elements of a communication link, definition of key terms, binary and multi level signaling, information transfer rate, calculation of channel capacity, bandwidth efficiency, baseband data transmission, the problem of inter symbol interference, Achieving a Nyquist channel response, recovery of symbols from noise, bit error rate performance for baseband data systems, Advantages of computer networks, LAN vs. WAN, ISO/OSI seven layer architecture, network topologies

UNIT---II (MAX 30 MARKS)

Physical layer : - transmission media, analog transmission, digital transmission
Data link layer: - Framing, error detection and correction, MAC layer, Ethernet network layer

UNIT---III (MAX 25 MARKS)

Network layer: - Routing algorithms – shortest path, distance vector, link state routing, flooding, hierarchical routing, Inter networking – Tunneling , Encapsulation, Fragmentation, Virtual circuits, data grams

UNIT---IV (MAX 40 MARKS)

Internet Protocol (IP), - header structure, address, options etc. , Routing protocols (examples : RIP, HELLO, OSPF, BGP), Classless inter domain routing, ICMP, ARP, RARP , BOOTP, DHCP.

UNIT---V (MAX 35 MARKS)

Transport layer : - Flow and error control, multiplexing, establishing and releasing a connection, Transmission Control Protocol (TCP), UDP, Domain Name Service.

Essential Reading:

1) B.A. Forouzan, Data Communication and Networking, Tata McGraw Hill, 4th Ed., 2007
2) A.S. Tanenbaum, Computer Networks, PHI, 4th Ed. , 2006

Supplementary Reading:

1) F.Halshall, Data Communication, Computer Networks and Open Systems, Pearson, 2003
3) B.A.Forouzan, TCP/IP Protocol Suit, Tata McGraw Hill, 3rd Ed., 2006

COURSE SYLLABUS FOR FIFTH SEMESTER SUBJECTS

SUBJECT: Theory of Computation

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT----I (MAX 50 MARKS)

Preliminaries Alphabets, strings, languages, state transition and state diagrams. Review of set and relation.

Finite Automata (Deterministic and Nondeterministic): Equivalence of DFA's and NDFAs, automata with ε-transitions, regular expressions. Moore and Mealy machines, properties of regular sets, minimization of finite automata, push down automata and context free languages.

UNIT---II (MAX 40 MARKS)

Turing machines: Type-O grammar and their equivalence, Turing hypothesis, Turing computability, Turing machine as a transducer, recognizer acceptors. Variations of Turing machine- nondeterministic, multiple tape, two way infinite tape, multidimensional, multi head. Turing machine as enumerator. Church's hypothesis. Primitive recursive functions, recursive function, recursively enumerable sets. Universal Turing machines. Non – deterministic linear space bounded TM (linear bounded automata) and context sensitive language (CSL), properties of CSL.

UNIT-III (MAX 30 MARKS)

Undecidability: The halting problem, halting problem of TM, partial solvability and undecidability results (related to language theory, e. g. equivalence of CFGs ambiguity of CFGs etc.). Turing enumerability, acceptability and decidability. Undecidability problem about Turing machine and recursive functions, post correspondence problem and example of some other undecidable problem.

UNIT---IV (MAX 35 MARKS)

Production Systems: Acceptors and generators, grammar , Chomsky hierarchy, context free grammar, Normal forms , CNF and GNF. Pumping lemma for CFL and regular languages. Derivation Graph, CYK algorithm.

Test Books/Reference Books:

1. J. E. Hopcroft and J. D. Ullman, Introduction to Automata Theory, Languages and Computations, Narosa Publishing House, 1999.
2. Wood, Theory of Computations.
3. Z. Kohavi, Switching and Finite Automata Theory.
4. E. V. Krishnamurthy, Introductory Theory of Computer Science, Affiliated East West Press Private Limited, 1984.
5. C. H. Papadimitriou, Theory of Computations.

SUBJECT: DATA BASE MANAGEMENT SYSTEM

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT----I (MAX 15 MARKS)

Introduction to database systems: data independence, data models, levels of abstraction, structure of DBMS

UNIT---II (MAX 20 MARKS)

Relational model, Integrity constraints, Relational languages

UNIT---III (MAX 25 MARKS) Query Languages: SQL, QUEL, QBE, Aggregate operators, Embedded and dynamic SQL.

UNIT---IV (MAX 25 MARKS)

File Organization – storage, buffer management, record and page formats , file organization techniques, indexing , query optimization : query processing on various operations , translating SQL queries, estimating the cost

UNIT---V (MAX 40 MARKS)

Database design – ER model , functional dependencies, normalization, multi valued dependencies

UNIT---VI (MAX 35 MARKS)

Concurrency control and recovery : - transaction, schedules , lock based concurrency , lock management, concurrency control without locking , Crash recovery : - log, check pointing , media recoveries
Database security,

UNIT---VII (MAX 35 MARKS)

Introduction to recent advances in database technology – parallel databases , data warehouse , real time database, mobile database, spatial database, design data base, multi media database, Distributed database design , Object oriented database design and implementation

Essential reading

1. J.D.Ullman, Principles of Database Systems, Galgotia, 2nd Ed. , 2003
2. A.Silbershatz, H.F.Korth and A.Sudarshan, Database System Concepts, McGraw Hill, 5th Ed., 2006

SUBJECT: SOFTWARE ENGINEERING

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I (MAX MARKS 20)

Introduction of Software Engineering: Software development and life cycle; project size and its categories.

UNIT-II (MAX MARKS 20)

Software project management: Planning of a software project; project-control and project team standards; scheduling, Risk management, configuration management. Software cost estimation and evaluation techniques.

UNIT-III (MAX MARKS 30)

Software requirements analysis and specification techniques- Different methodologies and techniques.

UNIT-IV (MAX MARKS 30)

Software Design: Various design concepts and notations; Modern design techniques; High level design and Detailed Design; Structured Design; Object-oriented design.

UNIT-V (MAX MARKS 10)

Coding: Standards and guidelines for Coding, Code walkthrough, code inspection.

UNIT-VI (MAX MARKS 10)

Verification and Validation Methods: Documentation and implementation procedures; Performance of software systems; software metrics and Models; Documentation of Project systems, manuals and implementation.

UNIT-VII (MAX MARKS 20)

Testing: Structural Testing, Unit Testing, Different Testing Techniques, Design of a test suite etc.

UNIT-VIII (MAX MARKS 10)

Software Reliability: Definition and concepts of software reliability, Software errors, faults, repair and availability-re-availability and availability models; use of database as a case tool. Software Quality Control and Management- ISO9000 and CMM-SEI models.

UNIT-IX (MAX MARKS 10)

Modern Programming Language Features Relevant to Software Engineering: Software development environments; User interface design using Visual C+ +, X/Motif and Java. Case tools.

Test Books/Reference Books:

1. R. E. Fairley, Software Engineering Concepts, McGraw-Hill Publication.
2. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, 1999.
3. Roger S. Pressman, Software Engineering: A Practitioners Approach, McGraw-Hill Publication.
4. Ian Somerville, Software Engineering, Addison Wesley.
5. C. Ghezzi M. Jazayeri and D. Mandrioli, Fundamentals of Software Engineering, Prentice-Hall of India, 1994.
6. Rajib Mall, Fundamentals of Software Engineering, Prentice-Hall of India,1999.
7. Bjarne Stroustroup, Object Oriented Programming Using C+ +, AT & T Lab.
8. D. Ince, ISO 9001 and Software Quality Assurance, McGraw-Hill Publication, 1994.
9. Douglas Young, X- Windows Programming.

SUBJECT: PRINCIPLES OF PROGRAMMING LANGUAGES

Theory: 100 Marks

Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT----I (MAX 15 MARKS)

The role of programming languages – towards high level languages, problems of scale, programming paradigms, language implementation- bridging the gap , language description – syntactic structure, expression notations, abstract syntax trees, lexical syntax, context free grammars, grammars for expressions, variants of grammars

UNIT---II (MAX MARKS 35)

Statements, structured programming, Types , data representations, procedure activations

UNIT---III (MAX MARKS 15)

Object oriented programming – groupings of data and operations, constructs for program structuring, information hiding, program design with modules, Modules and defined types,

UNIT----IV (MAX MARKS 40)

Class declarations in C++, dynamic allocation in C++, Templates – parameterized types, implementation of objects in C++, what is an object, object-oriented thinking, inheritance, object oriented programming in C++, An extended C++ example, Derived classes and information hiding, Objects in Smalltalk

UNIT---V (MAX MARKS 25)

Functional programming – elements of functional programming, functional programming in a typed language, functions as first-class values, ML, functional programming with lists

UNIT---VI (MAX MARKS 25)

Other paradigms – logic programming, an introduction to concurrent programming

Essential readings:

1. R. Sethi, Programming Languages – Concepts & Constructs, Pearson Education

Supplementary reading:

1. R.W.Sebesta, Concepts of Programming Languages, 8th Edition, Addison-Wesley
2. M.L.Scott, Programming Language Pragmatics, 2nd Edition, Morgan Kaufmann,2005

SUBJECT: WEB TECHNOLOGY

UNIT----I (MAX MARKS 25)

Internet and WWW, Creating web graphics, HTML, introduction to XHTML, cascading style sheets

UNIT---II (MAX MARKS 30)

Introduction to scripting, Java script: control statements, functions, arrays, objects, AJAX

UNIT---III (MAX MARKS 30)

Dynamic HTML: object model and collections, Filters and transitions, Extensible Markup Language (XML), Web Servers

UNIT---IV (MAX MARKS 45)

Java Technologies: JSP, EJB, Name Service, Secure Communication, MVC Architecture

UNIT---V (MAX MARKS 45)

Server side scripting: Active server pages, CGI and Perl, PHP

Essential reading:

1.H.M.Deitel,P.J.Deitel and T.R.Nieto, Internet and World Wide Web : How to Program, Pearson Education, 2000

2.Harvey Deitel , Paul Deitel , Tem Nieto, Complete Internet and World Wide Web Programming Training Course, Student Edition 2/e, Prentice Hall, 2002

COURSE SYLLABUS FOR SIXTH SEMESTER SUBJECTS

SUBJECT: PRINCIPLES OF ECONOMICS AND ACCOUNTANCY

SUBJECT: COMMUNICATION ENGINEERING

SUBJECT: MICROPROCESSOR AND APPLICATIONS

Syllabus common with Electrical Engineering and Instrumentation Engineering

SUBJECT: DESIGN AND ANALYSIS OF ALGORITHMS

Theory: 100 Marks
Sessional : 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT---I (MAX 15 MARKS)
Asymptotic notation, orders, time and space complexities, average and worst-case analysis, lower bounds.

UNIT---II (MAX 25 MARKS)
Divide and conquer, dynamic programming, backtracking, branch and bound, greedy methods, randomization, optimization problems

UNIT---III (MAX 25 MARKS)
Search trees: - Fibonacci heaps, binomial heaps, B^+ trees, Red-black tree, decision diagram, disjoint sets

UNIT---IV (MAX 30 MARKS)
Spanning tree, connected component, shortest paths, matching, max-flow, hashing algorithms

UNIT---V (MAX 40 MARKS)
String matching, computational geometry, median and order statistics

UNIT---VI (MAX 30 MARKS)

P, NP, NP-hard and NP complete, deterministic and non-deterministic polynomial time algorithms. Brief description about complexity classes and hierarchy. Approximation algorithms for same NP-complete problem.

UNIT---VII (MAX 25 MARKS)

Genetic algorithm, neural network , quantum computing, ant colony algorithms

Test Books/Reference Books:

1. T. H. Cormen, C. H. Leiserson and R. L. Rivest, Introduction to Algorithms, Prentice-Hall of India, 1988.
2. A. V. Aho, J. E. Hopcroft and J. D. Ullman, Design and Analysis of Algorithms, Addison Wesley.
3. D. E. Knut, The Art of Computer Programming, vol. 1 & 3. Addison Wesley.
4. E. Horowitz and S. Sahani, Fundamentals of Computer Algorithms, Galgotia Publication Limited, 1985.
5. K. Melhorn, Data Structures and Algorithms, vol. 1 & 2, Springer-Verlag.
6. C. H. Papadimitriou, Computational Complexity, Addison Wesley, 1994.

SUBJECT: COMPILER CONSTRUCTION

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT ----I (MAX 10 MARKS)

Review of machine architecture, instruction set and addressing modes. Difference between system software and application software, layered organization of system software.

Assemblers: Elements of assembly language processing, assembly process - single pass and two pass assembler, cross assembler macro processor, linking, loading and relocation , , relocatability.

Compilers: Phases of a Compiler. Language and grammar - type0, type1, type2 and typ-e3 , Chomsky hierarchy.

UNIT----II (MAX 25 MARKS)

Lexical analysis-finite automata, lexical analyzer, lexical analyzer generator (LEX and FLEX).

UNIT---III (MAX 50 MARKS)

Parsing- top down and bottom-up parser. Different types of parsing techniques- recursive decent, operator precedence, predictive parsing, LR parser-LR (0), LR (1), LALR etc., parser generator (YACC or BISCON). Error handling and recovery.

UNIT---IV (MAX 15 MARKS)

Symbol table –structure and management. Run time recovery management-static memory allocation and stack based memory allocation schemes.

UNIT---V (MAX 25 MARKS)

Intermediate code , Generation schemes-syntax directed translation-arithmetic and Boolean expressions, if-then else statement, while statement.

UNIT---VI (MAX 25 MARKS)

Target code generation-run time environment, storage (register) allocation, instruction mapping. Basic concept of code optimization.

UNIT---VII (MAX 25 MARKS)

Overview of structure of editors, debugger and interpreter.

Test Books/Reference Books:

1. *A. V. Aho, R. Sethi and J. D. Ullman, Compilers, Tools and Techniques, Addison-Wesley, 1987.*
2. *A. V. Aho and J. D. Ullman, Compiler Design.*
3. *D. M. Dhamdhere, Compiler Construction- Principles and Practice, MacMillan, India, 1981.*
4. *D. M. Dhamdhere, Introduction to System Software.*
5. *J. P. Trembley and P. G. Sorensen, The Theory and Practice of Compiler Writing, McGraw-Hill, 1984.*

SUBJECT: MINI PROJECT ON APPLICATION DEVELOPMENT

Students will develop a project based on the concepts learnt in Software Engineering and Web Technology. A report thereof has to be submitted in the department.

COURSE SYLLABUS FOR SEVENTH SEMESTER SUBJECTS

SUBJECT: INDUSTRIAL ORGANIZATION AND MANAGEMENT

SUBJECT: MICRO CONTROLLER APPLICATIONS

Common with Electrical Engineering and Instrumentation Engineering

SUBJECT: NETWORK SECURITY

Theory: 100
Sessional: 50(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT----I (MAX 35 MARKS)

Key exchange protocols, Diffie-Hellman and its variants, Man in the middle attack, PKI and certificate based key exchange, Key management, protocol weakness in TCP/IP and other protocols, various types of attacks

UNIT---II (MAX 25 MARKS)

Security protocol at application level – PGP , SHTTP, SSH etc. Security protocol at socket level – SS/TSL

UNIT---III (MAX 30 MARKS)

Security protocol at network level – IPSec , Security protocol for remote connection through dial-up – PPTP , L2TP etc. , Firewall and packet filtering, Proxy or application level gateways as security devices

UNIT---IV (MAX 35 MARKS)

Virtual private networks , Intrusion detection system , Privacy protection and anonymity services , Electronic payment system

Essential reading:

1. *W. Stalling, Cryptography and Network Security: Principles and Practices, 4th Edition, PHI, 2007*
2. *B.A.Forouzan , Cryptography and Network Security, McGraw Hill , 1st Edition*

Supplementary reading:

1. *J.M. Kizza, Computer Network Security, 2005*
2. *Peterson and Davie , Computer Networks A System Approach , Elsevier, 3rd Edition*

SUBJECT : COMPUTER GRAPHICS

Theory : 100 Marks

UNIT---I (MAX 20 MARKS)

Display Devices: Refresh cathode ray tubes, random scan and raster scan devices, colour CRT monitors, 3-D monitors. Display Processor- random scan system and raster scan system.

Interactive Input methods: Input devices, logical classification of input devices, input functions. Interactive picture construction techniques. Graphics software-co-ordinate representation, graphics functions, software standards-GKS, PHIGS etc.

UNIT---II (MAX 40 MARKS) Output Primitives: Points and lines, loading and frame buffer, line drawing algorithms - DDA, Bresenham's line drawing algorithms; circle generating algorithm-midpoint Circle algorithm. Attributes of output primitives: Lane attributes, curve attributes, colour tables, area fill attributes, character attributes, bundled attributes, anti aliasing.

UNIT---III (MAX 35 MARKS) Two Dimensional Viewing: Viewing, pipelines, windowing concepts, clipping algorithms, polygon clipping. Structure and Hierarchical models- Concept, editing, structure, basic modeling concepts.

UNIT---IV (MAX 40 MARKS) 3-D Concepts: 3-D viewing- view plane, dimension of window projections, 3-D display techniques; 3-D object representation- polygon surfaces; curved lines and surfaces- Spline curved, Bezier curves and surfaces; constructive solid geometry methods; Oc trees, Fractal geometry methods; 3-D transformations.

UNIT---V (MAX 25 MARKS) Visible surface detection methods: classification of algorithms, comparisons of algorithms. Illuminations Models and surface rendering models- Halftone patterns, Ray tracing.

UNIT---VI (MAX 20 MARKS) Introduction to colour models and applications, design of animation sequences, animation language. Use of graphics of Java language. Graphics part of Java has to be covered in this course.

Test Books/Reference Books:

1. D. Hearn and P. M. Backer, Computer Graphics, Prentice Hall of India, 1986.
2. W. K. Giloi, Interactive Computer Graphics, Prentice Hall of India, 1978.
3. W. Newman and R. F. Sproul, Principles of Interactive Computer Graphics, McGraw Hill Publication, 1980.
4. D. F. Rogers, Procedural Elements of Computer Graphics, McGraw-Hill Publication, 1983.
5. S. Harington, Computer Graphics: A Programming Approach, Tata McGraw-Hill Publication.
6. D. F. Rogers, Mathematical Elements of Computer Graphics, McGraw-Hill Publications, 1983.

List of Subjects for Elective – I

SUBJECT: ARTIFICIAL INTELLIGENCE

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT---I (MAX 35 MARKS) Introduction to the object and goals of Artificial Intelligence: Aim and scope of the artificial intelligence, problem space and problem characteristics, state space representation

Problem solving techniques: generate-and-test, hill-climbing, search, problem reduction techniques, constraint propagation, means-end-analysis, heuristic search techniques and heuristic for problem solving.

UNIT---II (MAX 25 MARKS) Game Playing: AND-OR graph search, game trees and associated searching techniques, minimax and alpha-beta pruning. Some case studies.

UNIT----III (MAX 60 MARKS) Knowledge representation and inference: Procedural and deductive approaches, production system formalism, predicate logic (first-order and second-order), rule based systems, semantic nets, conceptual dependencies, conceptual graph, frames, scripts and associated inference mechanisms. Resolution in predicate logic, unification, question answering, natural deduction and theorem proving, forward and backward deduction.

Different techniques for reasoning under uncertainty, monotonic and non-monotonic reasoning. Constraint satisfaction problem.

Rule based systems and expert systems- domain exploration, meta language, expertise transfer, self-explaining systems. Case studies(DENDRAL, MYCIN).

UNIT---IV (MAX 25 MARKS) Introduction to Neural Networks: Definition and representation of artificial neuron and its analogy with biological neuron. Basic concept of three layer neural network and learning by back-propagation. Basic properties of artificial neural net.

UNIT---V (MAX 20 MARKS) Basic syntax and semantics of LISP and PROLOG. Programming exercise from AI in LISP and PROLOG.

Test Books/Reference Books:

1. N. J. Nilsson, Principles of Artificial Intelligence, Springer-Verlag, 1980.
2. Rich and Knight, Artificial Intelligence, McGraw-Hill Publication.
3. Patterson, Introduction to Artificial Intelligence and Expert Systems.
4. Milner, Common LISP: A Tutorial, Prentice Hall of India,1988.
5. W. F. Clockshin and C. S. Mallish, Programming in PROLOG, Narosa Publishing House.
6. K. L. Clark and F. G. McCabe, Micro-Prolog, Prentice Hall of India, 1987.
7. Marcellus, Expert System Programming in Turbo-Prolog, Prentice Hall of India.

SUBJECT: PARALLEL ALGORITHMS

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT---I (MAX 35 MARKS) Modeling , Synchronous Network Model, Leader Election in a Synchronous Ring, Algorithms in General Synchronous Networks, Distributed Consensus with Link Failures, Distributed Consensus with Process Failures, More Consensus Problems,

UNIT---II (MAX 25 MARKS) Asynchronous System Model, Asynchronous Shared Memory model, Mutual Exclusion, Resource Allocation, Consensus, Atomic Objects

UNIT---III (MAX 40 MARKS) Asynchronous Network Model, Basic Asynchronous Network Algorithms, Synchronizers, Shared Memory versus Networks

Logical Time Global Snapshots and stable properties, Network Resource allocation, Asynchronous Networks with Process Failures

UNIT---IV (MAX 35 MARKS) Data Link Protocols, Partially Synchronous Models, Mutual Exclusion with Partial Synchrony, Consensus with Partial Synchrony.

Essential Reading:

1. B. Wilkinson & M. Allen, *Parallel Programming*, Pearson, 2nd Ed, 2005
2. M. J. Quinn, *Parallel Programming in C with MPI and OpenMP*, Tata McGraw Hill, 2003.

Supplementary Reading:

1. W. Groop, E. Lusk & A. Skjellum, *Using MPI: Portable Parallel Programming with the Message-passing Interface*, MIT Press, 1999.
2. H. F. Jordan and G. Alaghband, *Fundamentals of Parallel Processing*, Pearson, 1st Ed, 2003.
3. G. V. Wilson & G. Wilson, *Practical Parallel Programming*, MIT Press, 1995.

SUBJECT: VLSI SYSTEM DESIGN

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT---I (MAX 35 MARKS)

Deep sub - micron digital IC design; Transistors and Devices: MOS transistors; Bipolar transistors and circuits;

UNIT----II (MAX 60 MARKS)

Fabrication: IC fabrication technology; Simulation: Modeling the MOS transistor for Circuit Simulation; Silicon-on-Insulator technology; MOS Inverter circuits: Voltage transfer characteristics; Noise margin definitions; NMOS transistors as load devices; COMS inverter. Static MOS Gate circuits: CMOS gate circuits; Complex CMOS Gates; XOR and XNOR Gates; Flip-Flops and Latches;

UNIT--- III (MAX 45 MARKS)

Semiconductor memory design: MOS decoder; Static RAM cell design ;SRAM column I/O circuitry; Power Grid and Clock design: Power distribution design; clocking and timing issues; Phase-locked loop/Delayed-locked loop.

Essential Reading:

1. D. A. Hodges, H. G. Jackson & R. A. Saleh, *Analysis and Design of Digital Integrated circuits*, Tata McGraw Hill, 3rd Ed. 2008.
2. D. A. Pucknell & K. Eshraghian, *Basic VLSI Design,* Prentice Hall of India, 3rd Ed. 2001.

Supplementary Reading:

1. W. H. Wolf, *Modern VLSI Design System-on-chip design*, Prentice Hall of India, 3rd Ed. 2004.
2. C. Mead & L. Conway, *Introduction to VLSI system*, Addison Wesley, 2004.

SUBJECT: DIGITAL IMAGE PROCESSING

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I (MAX 15 MARKS)

Introduction: digital image representation, fundamental steps in image processing, elements of image processing systems, geometry of image formation, image acquisition, color image sensing, stereo imaging, range sensing, tessellation, sampling and quantization.

UNIT-II (MAX 30 MARKS)

Image Transforms: Fourier, Walsh, Hadamard, Discrete cosine transform, Hotelling transform and their properties.

Image Enhancement and Restoration: Spatial and frequency domain enhancement techniques (Histogram based techniques, smoothing, filtering, sharpening, homomorphic filtering), unconstrained and constrained restoration, inverse filtering, wiener filter.

UNIT-III (MAX MARKS 20)

Image Compression: Image compression models, error-free compression, lossy compression, image compression standards.

UNIT-IV (MAX MARKS 20)

Image Segmentation: Pixel classification, gray level thresholding, p-tile methods, edge detection and enhancement, Hough transform to detect lines and curves, region growing, edge following and edge linking.

UNIT-V (MAX 15 MARKS)

Digital Geometry and its Application in Image Processing: Neighborhood, connectedness, paths, holes and surroundings, borders, distances, medial axis transformation, shrinking and expanding, thining, morphological operations- (erosion, dilation, opening, closing, parallel implementation, smoothing, component labeling, thining).

Test Books/Reference Books:

1. *R. C. Gonzales and R. E. Woods, Digital Image Processing, Addison Wesley.*
2. *Anil K. Join, Fundamentals of Digital Image Processing, Prentice-Hall of India.*
3. *D. H. Ballard and C. M. Brown, Computer Vision, Prentice-Hall of India.*
4. *B. B. Choudhury and D. Dutta Mazumdar, Two tone Image Processing and Recognition.*

SUBJECT : EMBEDDED SYSTEM

UNIT---I (MAX 20 MARKS) Introduction: Embedded system, Processor, hardware units, software embedding, SOC, NOC, VLSI circuit;

UNIT----II (MAX 35 MARKS) Device and Device drivers, I/O devices, timer and counting devices, serial communication using IC, LAN and advanced I/O buses between the networked multiple devices, Host system, parallel communication using ISA, PCI, PCI-X and advanced buses, device drivers, parallel port device drivers in a system, serial port device drivers. Interrupt service handling mechanism;

UNIT----III (MAX 30 MARKS) Software and programming concepts: processor and memory selection for embedded system, embedded programming in C++, Java and UML, multiple processes and applications, problem of sharing data by multiple tasks and routines, inter process communication;

UNIT---IV (MAX 35 MARKS) Real time OS: OS services, I/O subsystem, Network OS, Real-time Embedded system, Need of well tested and debugged RTOS,

UNIT---V (MAX 20 MARKS) Introduction to C/OS-II. Case Studies of programming with RTOS:

UNIT---VI (MAX 35 MARKS) Smart card embedded system, Hardware and Software co-design: specification and design of an embedded system, use of software tools for development of an embedded system.

Essential Reading:

1. R. Kamal, *Embedded System Architecture, Programming and Design*, Tata McGraw Hill, 2005
2. R. Niemann, *Hardware Software Co design of Embedded System*, Kulwer Academic, 2006.

Supplementary Reading:

1. S. V. Iyer & P. Gupat, *Embedded Real Time System Programming*, Tata McGraw Hill, 2004.
2. W. Wolf, *Computer as Components: Principles of Embedded Computer System Design*, Elsevier, 2005
3. S. Heath, *Embedded System Design*, 2nd Ed, Elsevier, 2005.
4. R. Mall, *Real Time Systems Theory and Practice*, Pearson, 2008
5. F. Vahid & T. Givargis, *Embedded System design: A unified Hardware/Software approach*, Wiley, 2007
6. G. D. Michelli & L. Benin, *Network-on-Chip*, Morgan & Kaufman Publication, 2004.

COURSE SYLLABUS FOR EIGHTH SEMESTER SUBJECTS

SUBJECT: COMPUTER ARCHITECTURE

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT----I

Measure of computer performance; benchmarking , Instruction set design: CISC and RISC paradigm.

UNIT---II

Introduction to parallel processing: parallel processing mechanism, parallelism in uniprocessor systems, parallel computer structures, architecture classification schemes.

UNIT-III Overlap and pipeline processing: Instruction and arithmetic pipeline, pipeline hazards, techniques for eliminating/reducing hazards, handling interrupts, pipeline scheduling, super scalar and VLIW processor.

UNIT---IV

Vector Processors : Instruction set and vectorization techniques, vector processing requirements. Case study for vector processors.

UNIT---V

Array Processors: SIMD interconnection networks, parallel algorithms for array processors.

UNIT---VI

Multiprocessor architectures: Functional structures- loosely coupled and tightly coupled, multiprocessor interconnected networks, parallel memory organizations- memory management unit, memory interleaving,

memory hierarchy, improving cache performance, multiprocessor cache coherency, associative memory; multiprocessor control and algorithms, inter process communication mechanisms, system deadlock and protection, multiprocessor scheduling strategies, parallel algorithms for multiprocessors- synchronous and asynchronous.

UNIT---VII

VLSI computing architecture: Systolic array. Data flow computers: basic concept of data flow computer, data driven computing and languages, architecture for data flow computers, advantage and potential difficulties, performance of data flow computers.

Test Books/Reference Books:

1. *K. Hwang and F. A. Briggs, Computer Architecture and Parallel Processing, McGraw-Hill Publication, 1985.*
2. *S. Dasgupta, Computer Architecture- A Modern Synthesis, Vol. I & II, John Wiley.*
3. *H. Koggi, The Architecture of Pipelined Computers, McGraw-Hill,1981.*

SUBJECT : DISTRIBUTED SYSTEM

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT-I:
Introduction: Concept of distributed systems, architectures & languages and distributed algorithms.

UNIT-II:
Distributed model and communication protocols: balanced sliding window protocols and time based protocols.

UNIT-III:
Routing algorithms: Destination based routing, the all pairs shortest path problem, the Netchange algorithm, routing with compact routing tables, Hierarchical routing.

UNIT-IV:
Deadlock free packet switching.

UNIT-V:
Architecture of distributed system, issues of distributed system. Limitation of distributed system, absence of global clock and shared memory, logical clock and vector clocks, causal order of events and logical clock, Lamport logical clock, Chandy-Lamport's global state recording algorithm, terminal detection.

UNIT-VI:
Distributed Mutual Exclusion and Distributed Deadlock Detection. Distributed file sy-stem, distributed shared memory, distributed scheduling.

UNIT-VII:
Distributed failure recovery and fault tolerance.

Test Books/Reference Books:

1. *Gerard Tel, Distributed Systems.*
2. *M. Singhal and N. G. Shivaratri, Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems, McGraw-Hill Publication.*

List of Subjects for Elective-II

SUBJECT: KNOWLEDGE BASED COMPUTER SYSTEMS

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT---I (MAX 5 MARKS)
Introduction and general concept of knowledge

UNIT---II (MAX 40 MARKS)
Knowledge Representation: Formalized symbolic logics, inconsistencies and uncertainties, probabilistic reasoning, structured knowledge- graph, frames and related structure-d, object oriented representation. Knowledge organization and management

UNIT---III (MAX 35 MARKS)
Natural Language Processing: Grammars and Languages, basic parsing techniques, natural language generation, natural language system.

UNIT---IV (MAX 20 MARKS)
Knowledge Acquisition: General concepts, types and learning, general learning model, performance measures.

UNIT---V (MAX 40 MARKS)
Machine Learning: Perceptions, Learning Automata, Genetic Algorithms, learning by induction, inductive learners, concept of fuzzy logic in machine algorithms. Use of fuzzy logic in knowledge based system design and fuzzy system.

UNIT---VI (MAX 15 MARKS)
Concept of speech recognition and speech understanding.

Test Books/Reference Books:

1. D. W. Patterson, Introduction to Artificial Intelligence and Expert System, Prentice Hall of India.
2. Rice and Knight, Artificial Intelligence.

SUBJECT: OBJECT ORIENTED MODELING AND DESIGN

Theory: 100 Marks
Sessional: 50 Marks(Attendance:20 , Mid Term : 20 , Class test , assignment , viva , class performance : 10)

UNIT---I (MAX 15 MARKS)
Introduction: structured programming and object oriented programming paradigm. Usefulness of object oriented design and development.

UNIT----II (MAX 30 MARKS)
Object modeling: object modeling techniques- object and classes, link and associated concepts, generalization and inheritance, grouping constructs, aggregation, abstract classes, extension and restriction, multiple inheritance, metadata, candidate keys, constrains, constructor and destructor, memory allocation of objects, member function, templates, methods and messages, encapsulation, virtual base class, polymorphism, compile time polymorphism, virtual function. Dynamic binding versus static binding. Dynamic modeling and functional modeling.

UNIT----III (MAX 50 MARKS)
Object Oriented Design: object oriented design approaches- object oriented analysis, object oriented system design- object design, object modeling design (OMT) tools, phases of object oriented development. Notion of object diagram and its application in design.

UNIT---IV (MAX 25 MARKS)
Object oriented programming style, features of object oriented programming languages. Overview of Java and C+ +. Concepts of persistence, agents and widgets.

Design examples using object oriented modeling and design techniques and implementation of Java/C + +.

Test Books/Reference Books:

1. *J. Rambaugh, M. Blaha, W. Premerlani, F. Eddy and W. Lorenson, Object Oriented Modeling and Design, Prentice-Hall of India, 1988.*
2. *H. Schildt, The Complete Reference to C+ +, Osborn McGraw-Hill Publication.*

SUBJECT: Electronic Design Automation

Theory: 100 Marks
Sessional: 50 Marks

UNIT---I (MAX 30 MARKS)
Automated tools for logic level synthesis and simulation- Combinational circuits, sequential circuits on two level and multilevel implementations, gate arrays, EPGAs.

UNIT---II (MAX 30 MARKS)
Automated tools for layout synthesis- layout representation, floor planning, placement and routing. Case study.

UNIT---III (MAX 50 MARKS)
Automated tools for high level synthesis. Architectural models in synthesis. Design description language- VHDL and Verilog modeling style. Design representation and transformation partitioning, scheduling and allocation techniques.

UNIT---IV (MAX 45 MARKS)
Testable design- design for testability and build-in-self-test techniques. Test generation and fault simulation. Hardware-software co-design.

Test Books/Reference Books:

1. T. C. Hu and E. S. Kuh, VLSI Circuit Layout: Theory and Design, IEEE Press, 1985.
2. M. A. Breuer Ed., Design Automation of Digital Systems, Prentice-Hall, 1972.
3. T. Ohtsuki ed., Advanced in CAD for VLSI, Vol: 2-7. North Holland, 1986.
4. J. D. Ullman, Computational Aspects of VLSI, Computer Science Press, 1984.

SUBJECT: Pattern Recognition and Machine Learning

Theory: 100 Marks
Sessional: 50 Marks

UNIT---I (MAX 25 MARKS)
Introduction to pattern recognition, learning, formulation of problem under classificatory and descriptive formalism, statistical and syntactic approaches.

UNIT---II (MAX 20 MARKS)
Introduction to mathematical aspects, review of matrix methods and vector spaces, probability and decision making, formal languages and parsing, fuzzy decision methods, stochastic languages.

UNIT----III (MAX 30 MARKS)
Parametric and non-parametric methods of classification, basic results, supervised and unsupervised learning schemes, neural networks algorithms and learning.

UNIT---IV (MAX 30 MARKS)
Formal languages and higher dimensional languages for pattern recognition. Grammatical inference, Gold's results on identification of language in the limit, ramifications.

UNIT---V (MAX 35 MARKS)
Concepts of learning, Valiant's model of polynomial learn ability, complexity of inductive inference.
Learning in neural networks, Hopfield nets, back propagation networks, simulated annealing, Boltzmann machines, genetic algorithms.

Test Books/Reference Books:

1. R. O. Duda and P. E. Hart, Pattern Classification and Scene Analysis, Wiley International, 1974.
2. K. S. Fu, Syntactic Pattern Recognition, Academic Press, 1980.
3. M. L. Minsky and S. Papart, Perceptions, MIT Press, 1988.
4. J. L. McClellan and D. E. Rumelhart Eds, Parallel Distributed Processing. Vol. 1 & 2, MIT Press, 1986.

SUBJECT: Real Time Systems

UNIT---I (MAX 25 MARKS)

Introduction to Real-Time systems, applications of Real-Time systems, basic model of Real-Time systems, characteristics of Real-Time systems, types of Real-Time systems: hard, firm, soft, timing constraints, modeling timing constraints

UNIT----II (MAX 50 MARKS)

Real-Time task scheduling: basic concepts, clock driven scheduling, table driven scheduling, cyclic, schedulers, hybrid schedulers, event driven scheduling, EDF Scheduling, RMA, DMA, resource sharing among RT tasks, Priority inversion, Priority Inheritance Protocol, Highest Locker Protocol, Priority Ceiling Protocol, Scheduling Real-Time tasks in multiprocessor and distributed systems, Fault-tolerant scheduling of tasks, clocks in distributed Real-Time systems

UNIT---III (MAX 35 MARKS)

Commercial Real-Time Operating Systems, timers, UNIX and Windows as RTOS, POSIX, PSOS, VRTX, QNX, RT Linux, Lynx, other RTOS, benchmarking RTOS, RT communications, QoS framework, models,

UNIT---IV (MAX 30 MARKS)

Real-Time Communication in a LAN, IEEE 802.4, RETHER, Communication over Packet Switched Networks, Routing algorithms, RSVP, rate control

UNIT---V (MAX 35 MARKS)

RT databases, Applications, characteristics of temporal data, Concurrency control, Commercial RT databases.

Essential Reading:

1. P. A. Laplante, *Real-Time Systems Design & Analysis*, Willey, 3rd Ed, 2004.
2. R. Mall, *Real-Time Systems*, Pearson, 2007.

Supplementary Reading:

1. C. M. Krishna and K. G. Shin, *Real-Time Systems*, McGraw Hill, reprinted 2004.
2. J. W. S.Liu, *Real-time Systems,* Pearson Education, 6th impression, 2008.